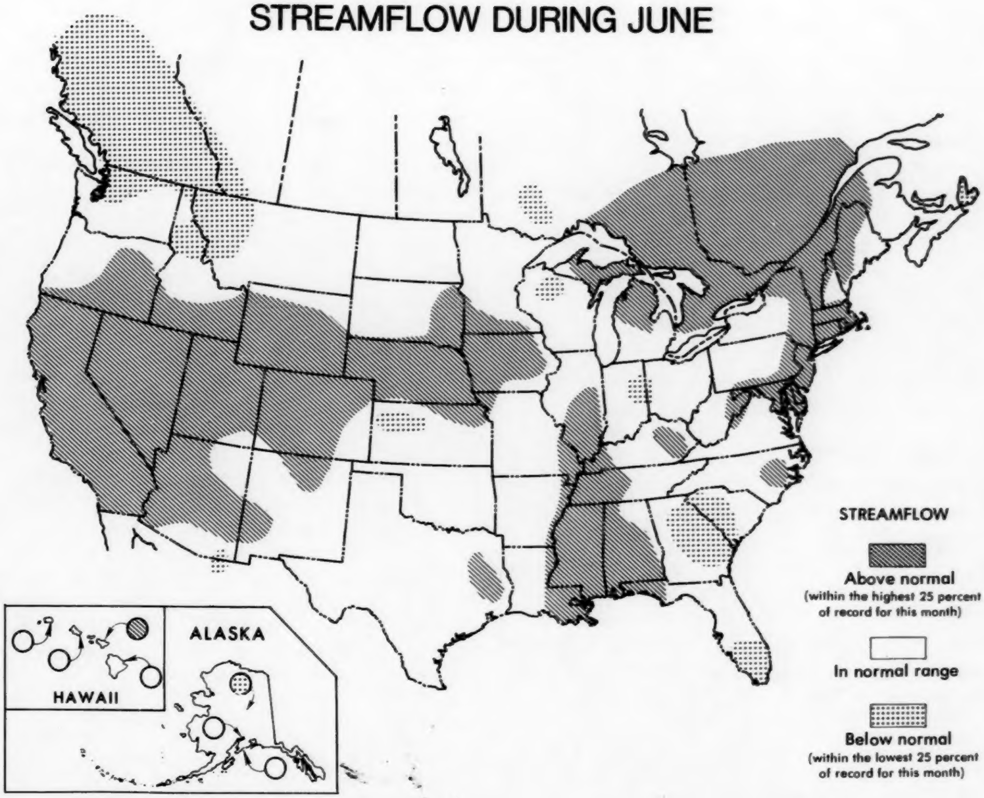
National Water Conditions

UNITED STATES
Department of the Interior
Geological Survey

CANADA
Department of the Environment
Water Resources Branch

JUNE 1983

STREAMFLOW DURING JUNE



Streamflow remained in the above-normal range in parts of the lower Mississippi River basin, most northeastern States, and in a broad band extending from Iowa westward to California. By contrast, parts of southwest Texas experienced severe drought conditions.

Severe floods occurred in the mountainous western States when record-deep accumulations of snow, containing the equivalent of up to 40 inches of water, started melting as a result of late spring rains and sharply warmer temperatures.

STREAMFLOW CONDITIONS DURING JUNE 1983

Streamflow generally decreased seasonally in southeastern Canada, Arizona, Washington, Hawaii, and in the eastern half of the United States during June. Monthly mean flows increased seasonally in Wyoming, Colorado, Utah, Nevada, and southwestern Canada, and were variable elsewhere. Flows remained in the above-normal range in parts of the lower Mississippi River basin and in a broad band extending from Iowa westward to California. Monthly and/or daily mean flows were highest of record for June in parts of Louisiana, Iowa, Wyoming, Kansas, Arizona, Utah, and California. (See table on page 3.) In southwestern Utah, for example, the monthly mean flow of 647 cubic feet per second (cfs) in Beaver River near Beaver (drainage area, 91.0 square miles) was highest for all months in 69 years of record and surpassed the previous high of 444 cfs that occurred in June 1980. (See graph on page 11.)

Warm temperatures triggered a rapid snowmelt in the Rocky Mountains and caused extensive flooding in the Colorado River basin. In Colorado, the flow of the Colorado River below Glenwood Springs (drainage area, 6,013 square miles) reached a peak discharge of 27,500 cfs on June 26, 1983 and was highest in 17 years of record. Downstream at Cameo, the flow reached a peak discharge of 36,000 cfs on June 27 and equaled the previous record high flow set at that site in June 1935. Below its confluence with the Gunnison River, near the Colorado-Utah State line, the Colorado River reached a peak discharge of 65,700 cfs on June 26, exceeding the previous peak of record of 56,800 cfs that occurred on June 9, 1957. The flow of 65,700 cfs at that site had a recurrence interval of about 100 years. Inflow to Lake Powell was close to 100,000 cfs at monthend and outflow from Glen Canyon Dam was as high as 92,000 cfs near the end of the month. Reservoir contents in most systems were the highest since dams were constructed. For example, monthend contents of the Colorado River Storage Project were 32,814,000 acre–feet, which was 104 percent of the normal maximum contents, and was the highest since Glen Canyon Dam was completed in 1964. Controlled releases of 40,000 cfs at Hoover, Davis, and Parker dams, caused severe flooding in the lower reaches of the Colorado River. In Utah, flooding eased considerably along the Wasatch front during June but high flows in the Sevier River caused extensive flooding of agricultural areas, particularly in Millard and Beaver Counties. Great Salt Lake reached a maximum elevation of 4,205.00 feet above mean sea level on June 30 and started a slow recession. The increase in elevation of 5.2 feet since September 15, 1982 was the greatest seasonal rise ever recorded, surpassing the previous high of 3.4 feet in 1906–07.

Snowmelt in the mountains of Colorado and Wyoming caused extensive flooding in the North and South Platte River basins. The Cache La Poudre River at Fort Collins and Clear Creek at Golden, Colorado, were running near or above record high flows and the monthly mean flow of 10,217 cfs in the North Platte River above Seminoe Reservoir near Sinclair, Wyoming (drainage area, 8,134 square miles) was highest for any month in 44 years of record. In Nebraska, the area east of North Platte downstream from the confluence of the North and South Platte Rivers was hardest hit by the flooding. Peak flows in this area were the highest in over 40 years or since Kingsley Dam was completed in 1941 on the North Platte River. For example, the peak discharge so far this year at Platte River at Brady was 23,000 cfs on June 29 following a peak discharge of 22,900 cfs reached on June 21. Both flows surpass the previous high of 18,600 cfs set on May 14, 1973. Peak discharges of about 22,000 cfs occurred on the Platte River at Overton and Grand Island, and were the highest since 1935 at those sites. In southeastern Nebraska, runoff from heavy rains on June 17 caused severe flooding on Plum Creek,

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NEW MAXIMUMS DURING JUNE 1983 AT STREAMFLOW INDEX STATIONS

Station number	Stream and place of determination	Drainage area (square miles)	Years of record	Previous June Maximums (period of record)		June 1983			
				Monthly mean in cfs (year)	Daily mean in cfs (year)	Monthly mean in cfs	Percent of median	Daily mean in cfs	Day
02489500	Pearl River near Bogalusa, La	6,630	45	12,920 (1946)	32,200 (1939)	24,279	610	70,700	1
06485500	Big Sioux River at Akron, Iowa . . .	9,030	55	4,750 (1942)	20,100 (1954)	5,860	484	20,500	22
06630000	North Platte River above Seminoe Reservoir near Sinclair, Wyo.	8,134	44	8,709 (1957)	13,400 (1957)	10,217	232	12,400	27
06884400	Little Blue River near Barnes, Kans.	3,324	57	3,843 (1967)	11,700 (1967)	2,910	405	23,700	19
07290000	Big Black River near Bovina, Miss.	2,810	47	5,878 (1946)	11,100 (1967)	3,516	325	12,300	1
09415000	Virgin River at Littlefield, Ariz . . .	5,090	54	457 (1980)	3,300 (1972)	1,118	1,450	2,570	1
10234500	Beaver River near Beaver, Utah . . .	90.7	69	444 (1980)	656 (1957)	647	622	......	...
10296000	West Walker River below Little Walker River, near Coleville Calif.	180	45	1,898 (1969)	3,090 (1969)	2,001	209	2,870	18
10322500	Humboldt River at Palisade, Nev.	5,010	76	3,104 (1971)	4,210 (1921)	3,970	370	6,050	4
11098000	Arroyo Seco near Pasadena, Calif . .	16.0	73	15.8 (1967)	20 (1967)	16	744	28	1
11264500	Merced River at Happy Isles Bridge near Yosemite, Calif.	469	68	2,636 (1938)	4,280 (1969)	3,413	272	4,200	18
11425500	Sacramento River at Verona, Calif.	21,257	54	35,180 (1967)	50,900 (1938)	39,730	351	47,200	6
11427000	North Fork American River at North Fork Dam, Calif.	342	42	2,213 (1967)	3,560 (1975)	2,876	413	4,250	11

a tributary to the Big Blue River near Seward. A mobile home park was flooded, about 100 people were evacuated, and an estimated 86,000 acres of farmland were flooded from Plum Creek, Lincoln Creek, and Big Blue River.

In New Jersey, monthly mean flows at all index stations decreased seasonally but remained in the above-normal range. Runoff from heavy rains in the southern part of the State caused a dam failure on the Cohansey River resulting in some flooding along that stream.

Moderate flooding was also reported during the month in parts of northwest Iowa, northwestern Ohio, North Dakota, North Carolina, and Minnesota.

In California, monthly mean flows at most index stations were highest of record for June. The combined contents of ten index reservoirs in northern and central California increased sharply to 122 percent of average at month's end and were 100 percent of the contents one year ago.

The above-normal trend in streamflow was again reflected in the combined flow of three large rivers—Mississippi, St. Lawrence, and Columbia—which averaged 2,009,000 cfs during June, down 12 percent from last month but still 49 percent above average for June. The daily mean flow of 1,760,000 cfs on June 1 on the Mississippi River at Vicksburg was highest for June in 55 years of record.

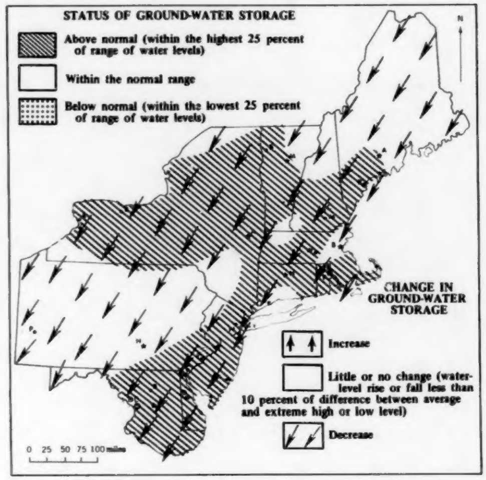
Monthend contents of principal reservoirs were near or well above average at most locations during June.

GROUND-WATER CONDITIONS DURING JUNE 1983

Ground-water levels declined seasonally in nearly all the Northeast. (See map.) Above-average ground-water storage conditions persisted in much of the region, including most of Maryland, Delaware, New York, and central and southern New England. In a few key observation wells in New England, levels were highest for end of June during the entire 25- to 35-year period of record.

In the southeastern States, ground-water levels declined in Virginia, Arkansas, and Alabama, in most of West Virginia and Georgia. Trends were mixed in other States. Water levels were above average in Kentucky, Virginia, North Carolina, and Alabama, largely below average in West Virginia, and above and below average in Arkansas, Louisiana, and Florida. A new high ground-water level for June was reached in Kentucky, and several new June highs occurred in Mississippi. In Alabama, the level in the Centreville well equaled the June high level set in 1980.

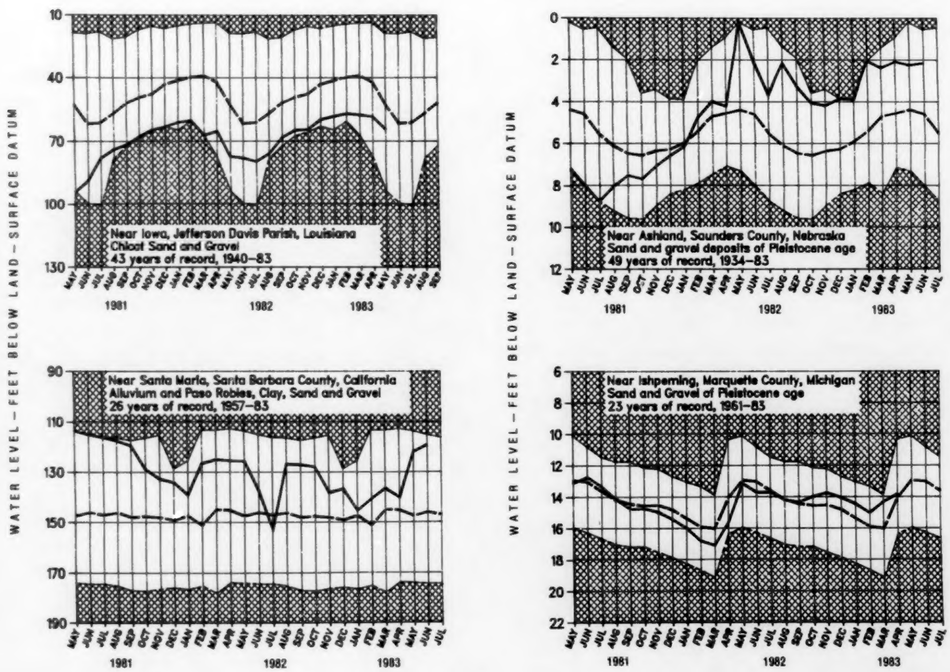
In the central and western Great Lakes States, ground-water levels declined in Minnesota, Ohio, and in most of



Map shows ground-water storage near end of June and change in ground-water storage from end of May to end of June.

MONTH-END GROUND-WATER LEVELS IN KEY WELLS

Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates average of monthly levels in previous years. Heavy line indicates level for current period.



WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES JUNE 1983

Aquifer and location	Current water level in feet below land-surface datum	Departure from average in feet	Net change in water level in feet since: Last month	Last year	Year records began	Remarks
Glacial drift at Hanska, south-central Minnesota	-5.03	+0.64	-2.27	+0.08	1943	
Glacial drift at Roscommon in north-central part of Lower Peninsula, Michigan	-3.16	+1.08	-0.18	+1.05	1935	
Glacial drift at Marion, Iowa	-4.38	-0.14	-2.16	-1.79	1941	
Glacial drift at Princeton in northwestern Illinois	-8.64	+0.83	-1.34	+0.47	1943	
Petersburg Granite, southeastern Piedmont near Fall Zone, Colonial Heights, Virginia	-14.85	+0.59	-1.33	-0.35	1939	
Glacial outwash sand and gravel, Louisville, Kentucky	-17.40	+8.11	+0.30	+0.80	1946	
500-foot sand aquifer near Memphis, Tennessee (U.S. well no. 2)	-101.50	-13.31	-0.18	-1.79	1941	
Granite in eastern Piedmont Province, Chapel Hill, North Carolina	-37.74	+3.75	+0.29	+3.11	1931	
Sparta Sand in Pine Bluff industrial area, Arkansas	-231.40	-26.46	-1.50	+4.00	1958	
Copper Ridge and Chepultepec Dolomites, Centreville, Alabama	-26.6	+2.3	-1.2	+1.7	1952	Equals June 1980 high.
Limestone aquifer on Cockspur Island, Savannah area, Georgia	-23.45	-5.20	-1.65	+0.95	1956	
Sand and gravel in Puget Trough, Tacoma, Washington	-100.39	+10.32	-0.26	+5.12	1952	
Pleistocene glacial outwash gravel, North Pole, northern Idaho (U.S. well no. 3)	-455.5	+4.0	0	+2.9	1929	
Snake River Group: southwestern Snake River Plain aquifer, at Eden, Idaho	-126.6	-8.0	+1.7	1.0	1957	
Alluvial sand and gravel, Platte River Valley, Nebraska (U.S. well no. 6)	-2.16	+2.41	+0.11	-0.04	1935	
Alluvial valley fill in Steptoe Valley, Nevada	-9.71	+3.35	-0.29	+0.93	1950	Alltime high.
Ogallala Formation, Kansas Agricultural Experiment Station at Colby in the High Plains of northwestern Kansas	-124.50	-7.65	-0.27	-0.03	1947	June low.
Alluvium and Paso Robles, clay, sand, and gravel, Santa Maria Valley, California	-119.24	+25.37	+2.81	+17.84	1957	
Valley fill, Elfrida area, Douglas, Arizona (U.S. well no. 15)	-121.6	-42.91	-10.3	-9.1	1951	Alltime low.
Berrendo-Smith well in San Andres Limestone, Roswell artesian basin of Pecos Valley, New Mexico (U.S. well no. 1-A)	-65.15	+1.33	-2.91	+1.24	1966	
Hueco bolson, El Paso area, Texas	-260.95	-12.32	-0.94	+1.48	1965	
Evangeline aquifer, Houston area, Texas	-319.16	-23.18	-3.45	+4.18	1965	

Iowa; levels changed little in Indiana, and trends were mixed in Michigan. Levels were above average in Michigan, average in Ohio, and above and below average in Minnesota and Iowa.

In the western States, ground-water levels mostly rose in Idaho, but declined in Washington, North Dakota, Nevada, and New Mexico. Levels showed mixed trends in Nebraska, southern California, Utah, Kansas, Arizona, and Texas. Ground-water levels were above average in southern California and below average in Arizona; levels were above and below average in the other western States. A new high ground-water level for June was recorded in southern California in the Upper Cuyama Valley observation well; new low levels for June were noted in Kansas, Arizona, and New Mexico. Despite a net decline during June, a new alltime high level was recorded in the Steptoe Valley observation well in Nevada in 33 years of record. A new alltime low level was reached in the Elfrida area observation well in Douglas County, Arizona, in 32 years of record.

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF JUNE 1983

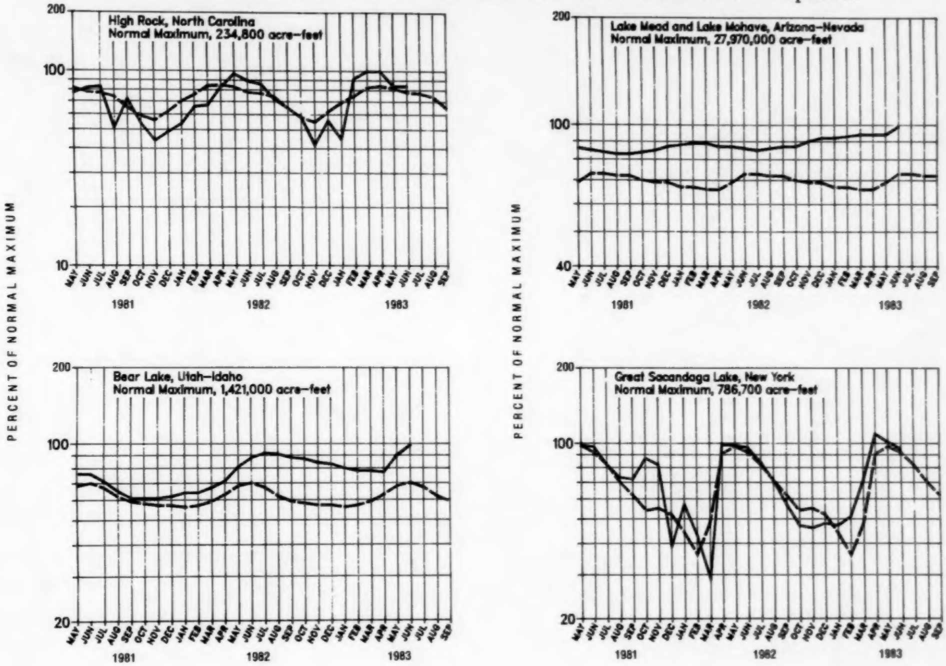
[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

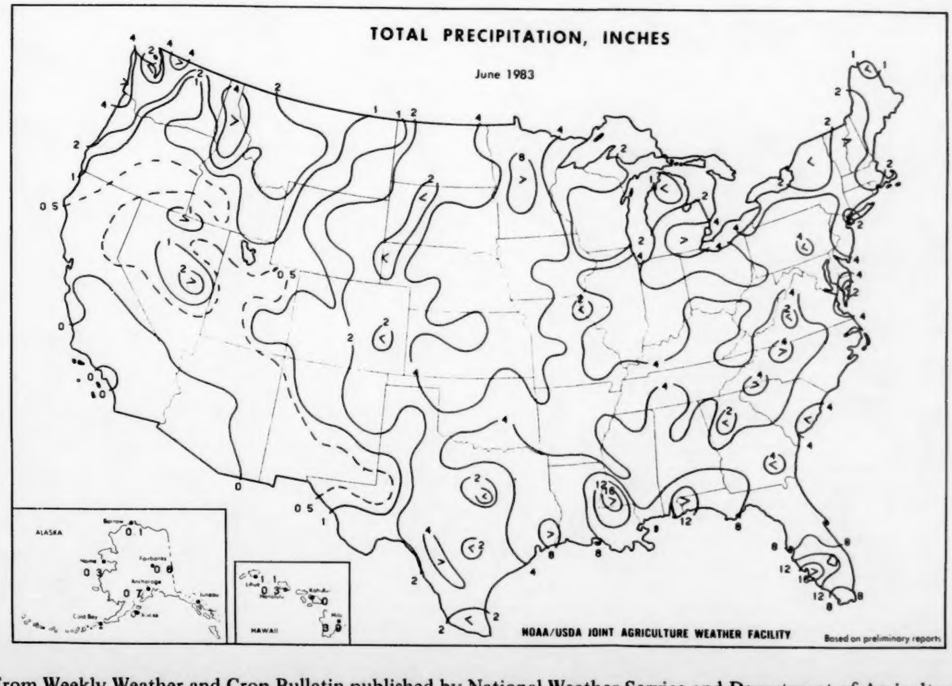
Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	Percent of normal maximum				Normal maximum (acre-feet)[a]
	End of June 1983	End of June 1982	Average for end of June	End of May 1983	
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	76	77	71	77	[b]226,300
QUEBEC					
Allard (P)	87	87	83	91	280,600
Gouin (P)	98	52	67	84	6,954,000
MAINE					
Seven reservoir systems (MP)	95	91	87	101	4,098,000
NEW HAMPSHIRE					
First Connecticut Lake (P)	92	92	90	93	76,450
Lake Francis (FPR)	84	83	87	97	99,310
Lake Winnipesaukee (PR)	99	102	96	105	165,700
VERMONT					
Harriman (P)	89	86	83	94	116,200
Somerset (P)	92	131	86	98	57,390
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	86	95	88	92	77,920
NEW YORK					
Great Sacandaga Lake (FPR)	95	96	92	101	786,700
Indian Lake (FMP)	95	95	101	100	103,300
New York City reservoir system (MW)	96	98	...	100	1,680,000
NEW JERSEY					
Wanaque (M)	97	101	89	102	85,100
PENNSYLVANIA					
Allegheny (FPR)	47	46	48	44	1,180,000
Pymatuning (FMR)	116	99	97	102	188,000
Raystown Lake (FR)	63	77	61	68	761,900
Lake Wallenpaupack (PR)	85	79	85	79	157,800
MARYLAND					
Baltimore municipal system (M)	99	86	93	100	255,800
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	96	95	91	94	288,800
Narrows (Badin Lake) (P)	92	95	97	92	128,900
High Rock Lake (P)	84	89	79	84	234,800
SOUTH CAROLINA					
Lake Murray (P)	93	96	80	96	1,614,000
Lakes Marion and Moultrie (P)	83	85	78	87	1,862,000
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	80	78	73	85	1,730,000
GEORGIA					
Burton (PR)	99	98	94	98	104,000
Sinclair (MPR)	89	88	90	88	214,000
Lake Sidney Lanier (FMPR)	67	62	65	68	1,686,000
ALABAMA					
Lake Martin (P)	99	109	92	100	1,375,000
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	71	37	61	80	2,229,300
Douglas Lake (FPR)	83	68	68	90	1,394,000
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	85	79	81	92	1,012,000
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	82	70	68	88	2,880,000
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	91	77	83	97	1,478,000
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	91	85	87	91	365,000
Wisconsin River (21 reservoirs) (PR)	91	79	82	91	399,000
MINNESOTA					
Mississippi River headwater system (FMR)	37	35	39	28	1,640,000
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	89	84	92	84	22,700,000
SOUTH DAKOTA					
Angostura (I)	95	95	90	95	127,600
Belle Fourche (I)	84	102	71	96	185,200
Lake Francis Case (FIP)	84	78	83	74	4,834,000
Lake Oahe (FIP)	97	92	...	97	22,530,000
MIDCONTINENT REGION—Continued					
SOUTH DAKOTA—Continued					
Lake Sharpe (FIP)	100	98	100	101	1,725,000
Lewis and Clarke Lake (FIP)	93	83	87	80	477,000
NEBRASKA					
Lake McConaughy (IP)	97	85	80	98	1,948,000
OKLAHOMA					
Eufaula (FPR)	102	112	96	109	2,378,000
Keystone (FPR)	103	141	107	71	661,000
Tenkiller Ferry (FPR)	105	119	101	110	628,200
Lake Altus (FIMR)	82	84	70	75	133,000
Lake O'The Cherokees (FPR)	95	107	96	105	1,492,000
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	100	132	101	103	2,722,000
TEXAS					
Bridgeport (IMW)	87	103	53	87	386,400
Canyon (FMR)	94	97	81	93	385,600
International Amistad (FIMPW)	80	97	82	84	3,497,000
International Falcon (FIMPW)	39	99	68	36	2,668,000
Livingston (IMW)	101	101	88	105	1,788,000
Possum Kingdom (IMPRW)	96	99	99	93	570,200
Red Bluff (PI)	13	15	26	14	307,000
Toledo Bend (P)	98	96	92	103	4,472,000
Twin Buttes (FIM)	31	49	31	31	177,800
Lake Kemp (IMW)	87	102	93	87	268,000
Lake Meredith (FWM)	52	34	37	52	796,900
Lake Travis (FIMPRW)	94	94	82	95	1,144,000
THE WEST					
WASHINGTON					
Ross (PR)	91	89	90	45	1,052,000
Franklin D. Roosevelt Lake (IP)	94	94	101	33	5,022,000
Lake Chelan (PR)	100	90	96	71	676,100
Lake Cushman (PR)	102	100	98	100	359,500
Lake Merwin (P)	101	103	105	100	245,600
IDAHO					
Boise River (4 reservoirs) (FIP)	89	98	89	80	1,235,000
Coeur d'Alene Lake (P)	102	88	84	104	238,500
Pend Oreille Lake (FP)	99	97	98	79	1,561,000
IDAHO--WYOMING					
Upper Snake River (8 reservoirs) (MP)	95	88	85	86	4,401,000
WYOMING					
Boysen (FIP)	106	78	88	73	802,000
Buffalo Bill (IP)	105	98	102	73	421,300
Keyhole (F)	35	31	52	45	193,800
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	99	64	64	81	3,056,000
COLORADO					
John Martin (FIR)	47	5	18	25	364,400
Taylor Park (IR)	81	58	94	37	106,200
Colorado–Big Thompson project (I)	89	61	75	66	722,600
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	104	89	...	94	31,620,000
UTAH--IDAHO					
Bear Lake (IPR)	99	88	70	90	1,421,000
CALIFORNIA					
Folsom (FIP)	100	96	88	76	1,000,000
Hetch Hetchy (MP)	100	100	82	40	360,400
Isabella (FIR)	110	98	50	69	568,100
Pine Flat (FI)	90	97	72	46	1,001,000
Clair Engle Lake (Lewiston) (P)	100	100	90	91	2,438,000
Lake Almanor (P)	103	109	66	89	1,036,000
Lake Berryessa (FIMW)	98	98	84	101	1,600,000
Millerton Lake (FI)	100	104	83	32	503,200
Shasta Lake (FIPR)	103	100	87	102	4,377,000
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	68	98	73	68	744,600
NEVADA					
Rye Patch (I)	95	76	69	90	194,300
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	99	86	73	94	27,970,000
ARIZONA					
San Carlos (IP)	62	19	18	65	1,073,000
Salt and Verde River system (IMPR)	92	79	46	96	2,073,000
NEW MEXICO					
Conchas (FIR)	88	45	80	82	330,100
Elephant Butte and Caballo (FIPR)	57	38	31	50	2,453,000

[a]1 acre-foot = 0.0436 million cubic feet = 0.326 million gallons = 0.504 cubic feet per second day.
[b]Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS, MAY 1981 TO JUNE 1983

Dashed line indicates average of month-end contents. Solid line indicates current period.





(From Weekly Weather and Crop Bulletin published by National Weather Service and Department of Agriculture.)

Provisional data; subject to revision

FLOW OF LARGE RIVERS DURING JUNE 1983

Station number	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1980 (cubic feet per second)	June 1983					
				Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge, 1951–80	Change in discharge from previous month (percent)	Discharge near end of month		
							Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine	5,690	9,647	14,545	153	-61	4,030	2,604	30
01318500	Hudson River at Hadley, N.Y	1,664	2,909	3,800	184	-57	1,350	872	30
01357500	Mohawk River at Cohoes, N.Y	3,456	5,734	3,490	132	-74	1,500	970	30
01463500	Delaware River at Trenton, N.J	6,780	11,750	12,700	177	-34	12,900	8,340	30
01570500	Susquehanna River at Harrisburg, Pa	24,100	34,530	27,400	147	-61	23,400	15,120	29
01646500	Potomac River near Washington, D.C.	11,560	[1]11,490	11,600	153	-54	9,000	5,800	30
02105500	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	5,005	2,000	79	-56	1,600	1,030	30
02131000	Pee Dee River at Peedee, S.C	8,830	9,851	7,110	93	-38	4,740	3,063	28
02226000	Altamaha River at Doctortown, Ga	13,600	13,880	6,316	82	-53	6,180	3,994	29
02320500	Suwannee River at Branford, Fla	7,880	6,987	8,524	161	-56	7,890	5,099	28
02358000	Apalachicola River at Chattahoochee, Fla	17,200	22,570	16,900	105	-23	17,700	11,440	24
02467000	Tombigbee River at Demopolis lock and dam near Coatopa, Ala	15,400	23,300	24,900	340	-69	28,800	18,610	30
02489500	Pearl River near Bogalusa, La	6,630	9,768	24,279	610	+1	22,400	14,480	30
03049500	Allegheny River at Natrona, Pa	11,410	[1]19,480	14,200	152	-63	11,000	7,100	27
03085000	Monongahela River at Braddock, Pa.	7,337	[1]12,510	9,790	164	-67	14,900	9,630	23
03193000	Kanawha River at Kanawha Falls, W. Va	8,367	12,590	9,830	140	-48	9,830	6,353	30
03234500	Scioto River at Higby, Ohio	5,131	4,547	3,550	118	-76	2,780	1,796	30
03294500	Ohio River at Louisville, Ky[2]	91,170	116,000	83,560	133	-75	45,700	29,540	26
03377500	Wabash River at Mount Carmel, Ill	28,635	27,220	26,700	130	-72	16,000	10,300	30
03469000	French Broad River below Douglas Dam, Tenn	4,543	6,798	4,763	89	-60	.....	.....	...
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wis[2]	6,150	4,163	3,878	106	-14	2,699	1,744	26
04264331	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	242,700	297,730	106	+6	291,000	188,100	30
050115	St. Maurice River at Grand Mere, Quebec	16,300	25,150	74,000	252	+52	24,000	15,500	22
05082500	Red River of the North at Grand Forks, N. Dak	30,100	2,551	5,006	120	+79	11,200	7,240	26
05133500	Rainy River at Manitou Rapids, Minn.	19,400	12,830	12,400	60	+62	17,200	11,120	27
05330000	Minnesota River near Jordan, Minn.	16,200	3,402	8,664	151	-47	12,800	8,270	23
05331000	Mississippi River at St. Paul, Minn	36,800	[1]10,610	21,553	128	-23	37,300	24,110	27
05365500	Chippewa River at Chippewa Falls, Wis.	5,600	5,100	4,106	78	-41	865	559	25
05407000	Wisconsin River at Muscoda, Wis	10,300	8,617	9,444	96	-26	5,475	3,538	24
05446500	Rock River near Joslin, Ill	9,551	5,873	8,000	137	-29	7,000	4,500	30
05474500	Mississippi River at Keokuk, Iowa	119,000	62,620	94,000	110	-38	98,000	63,300	30
06214500	Yellowstone River at Billings, Mont	11,796	7,038	22,570	77	+146	23,900	15,450	27
06934500	Missouri River at Hermann, Mo	524,200	79,490	152,000	176	-27	139,000	89,800	30
07289000	Mississippi River at Vicksburg, Miss[4]	1,140,500	576,600	1,245,500	236	-22	700,000	450,000	30
07331000	Washita River near Dickson, Okla.	7,202	1,368	2,145	164	-60	1,970	1,273	26
08276500	Rio Grande below Taos Junction Bridge, near Taos, N. Mex	9,730	725	3,621	498	+77	3,300	2,130	30
09315000	Green River at Green River, Utah.	40,600	6,298	37,933	222	+142	41,400	26,760	30
11425500	Sacramento River at Verona, Calif	21,257	18,820	39,730	351	-23	29,900	19,300	30
13269000	Snake River at Weiser, Idaho	69,200	18,050	44,500	184	+2	28,400	18,360	29
13317000	Salmon River at White Bird, Idaho	13,550	11,250	50,800	119	+73	34,600	22,360	29
13342500	Clearwater River at Spalding, Idaho	9,570	15,480	28,700	71	-15	18,600	12,020	29
14105700	Columbia River at The Dalles, Oreg[5]	237,000	193,100	466,100	97	+12	212,300	137,210	28
14191000	Willamette River at Salem, Oreg.	7,280	23,510	13,100	109	-38	11,200	7,240	28
15515500	Tanana River at Nenana, Alaska.	25,600	23,460	35,735	77	+44	48,000	31,000	30
8MF005	Fraser River at Hope, British Columbia.	83,800	96,290	215,391	87	+50	191,700	123,900	29

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

Provisional data; subject to revision

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR JUNE 1983 AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	June data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean (tons per day)	Minimum (tons per day)	Maximum (tons per day)	Mean in°C	Minimum, in°C	Maximum, in°C
	NORTHEAST										
01463500	Delaware River at	1983	12,720	76	113	3,081	1,670	4,920	22.0	16.0	26.0
	Trenton, N.J.	1945–82	9,440	60	143	......	495	22,100	....	13.5	34.0
	(Morrisville, Pa.)	(Extreme yr)		(1945)	(1965)		(1965)	(1973)			
			c7,176								
04264331	St. Lawrence River at	1983	298,000	165	167	134,000	130,000	136,000	15.5	12.0	19.0
	Cornwall, Ontario, near	1976–82	304,900	165	171	136,000	110,000	250,000	15.0	11.5	18.0
	Massena, N.Y.	(Extreme yr)		(1981–82)	(1981)		(1977)	(1981)			
	median streamflow at		c280,200								
	Ogdensburg, N.Y.										
	SOUTHEAST										
0728900	Mississippi River at	1983	*1,250,000	......	......	......	......	......	....	....	....
	Vicksburg, Miss.	1976–82	638,300	176	316	286,000	34,400	579,000	25.0	17.0	31.0
		(Extreme yr)		(1981)	(1976)		(1978)	(1979)			
			c546,500								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam	1983	**356,000	176	288	......	102,000	731,000	....	18.5	24.0
	53, near Grand Chain, Ill.	1955–82	217,600	111	300	......	27,000	396,000	....	16.5	30.5
	(25 miles west of Paducah,	(Extreme yr)		(1974)	(1970)		(1977)	(1981)			
	Ky.; streamflow station		c175,700								
	at Metropolis, Ill.)										
	MIDCONTINENT										
06934500	Missouri River at Hermann,	1983	152,000	301	423	149,000	123,000	188,000	23.0	19.5	27.0
	Mo. (60 miles west of St.	1976–82	107,800	207	448	90,700	44,000	187,000	24.0	19.0	28.0
	Louis, Mo.)	(Extreme yr)		(1977)	(1980)		(1977)	(1982)			
			c86,260								
	WEST										
14128910	Columbia River at	1983	286,000	69	96	60,400	39,200	103,000	16.5	16.0	17.0
	Warrendale, Oreg.	1976–82	262,100	61	107	55,400	19,100	97,900	15.0	12.5	19.5
	(streamflow station	(Extreme yr)		(1976)	(1977)		(1977)	(1981)			
	at The Dalles, Oreg.)		c481,150								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1951–80, for comparison with data for current month.
*Dissolved-solids and water-temperature records are not available for June.
**Dissolved-solids and water-temperature records are for the first 23 days of June.

POTENTIALLY FAVORABLE AREAS FOR LARGE-YIELD WELLS IN THE RED RIVER FORMATION AND MADISON LIMESTONE IN PARTS OF MONTANA, NORTH DAKOTA, SOUTH DAKOTA, AND WYOMING

The abstract and illustration below are from the report, *Potentially favorable areas for large-yield wells in the Red River Formation and Madison Limestone in parts of Montana, North Dakota, South Dakota, and Wyoming,* by L. M. MacCary, E. M. Cushing, and D. L. Brown: U.S. Geological Survey Professional Paper 1273-E, 13 pages, 1983. This report may be purchased for $4.25 from Eastern Distribution Branch, Text Products Section, U.S. Geological Survey, 604 South Pickett St., Alexandria, VA 22304 (check or money order payable to U.S. Geological Survey); or from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (payable to Superintendent of Documents).

ABSTRACT

The need for large quantities of energy has created interest in the Fort Union coal region of the Northern Great Plains. Extensive development of this coal, which may include onsite steam-power generation, gasification, liquefaction, and slurry-pipeline transport of the coal from this region, would place a significant demand on the region's limited streamflow. Aquifers in the Paleozoic rocks that underlie the Fort Union coal region, including the Red River Formation and the Madison Limestone, might supply, at least on a temporary basis, a significant part of the water required for coal development. The area of study encompasses approximately 200,000 square miles, and includes eastern Montana, western North Dakota and South Dakota, northeastern Wyoming, and northwestern Nebraska.

This report, one of a series in the Madison Limestone study, uses hydrologic and geologic data to outline potentially favorable areas for well construction—that is, areas in which there is a good probability that large-yield wells (more than 500 gallons per minute) can be completed in the Red River Formation in the Madison Limestone. Potentially favorable areas in terms of aquifer characteristics, for both the Red River Formation and the Madison Limestone, are given a numerical evaluation from 1 to 3 based on the number of the following criteria that are met: (1) The presence of relatively porous rock more than 100 feet thick, (2) the presence of dolomite more than 100 feet thick, and (3) the presence of known geologic structures that could affect yield. Areas rated 3 are those in which all three criteria are met; areas rated 2 are those in which two criteria are met; and areas rated 1 are those in which only one criterion is met. The criteria selected for this analysis were chosen because they can be recognized and mapped throughout the entire study area. Local features such as minor structures, solution zones, and rock facies of small extent were not included in this regional evaluation. In addition, water quality was considered in a general way in defining the favorable areas, by excluding areas in which the electrical resistivity of formation water, as calculated from geophysical well logs, was less than 1 ohm-meter. The numerical scales of the Red River Formation and Madison Limestone are summed to show potentially favorable areas for the combined aquifers. (See figure 1.) Certain additional factors that may be important to a prospective water user were not included in the numerical ranking—these include depths to the two aquifers, calcite saturation, water temperature, dissolved-solids concentrations, and potentiometric head in relation to land surface. For a complete evaluation, potential users need to consider these factors plus local structures, facies, and solution zones in conjunction with the numerical rankings reflecting aquifer characteristics. To facilitate consideration of potentiometric head, maps are included in this report showing areas in which the potentiometric head is within certain ranges with respect to land surface.

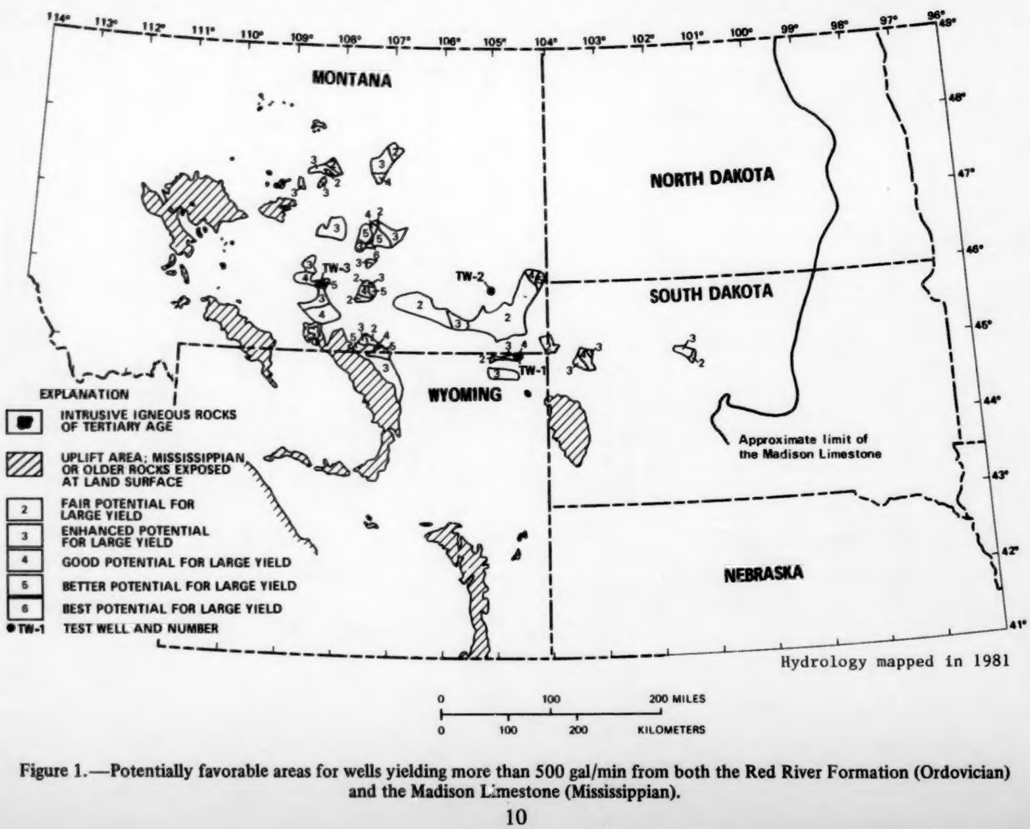
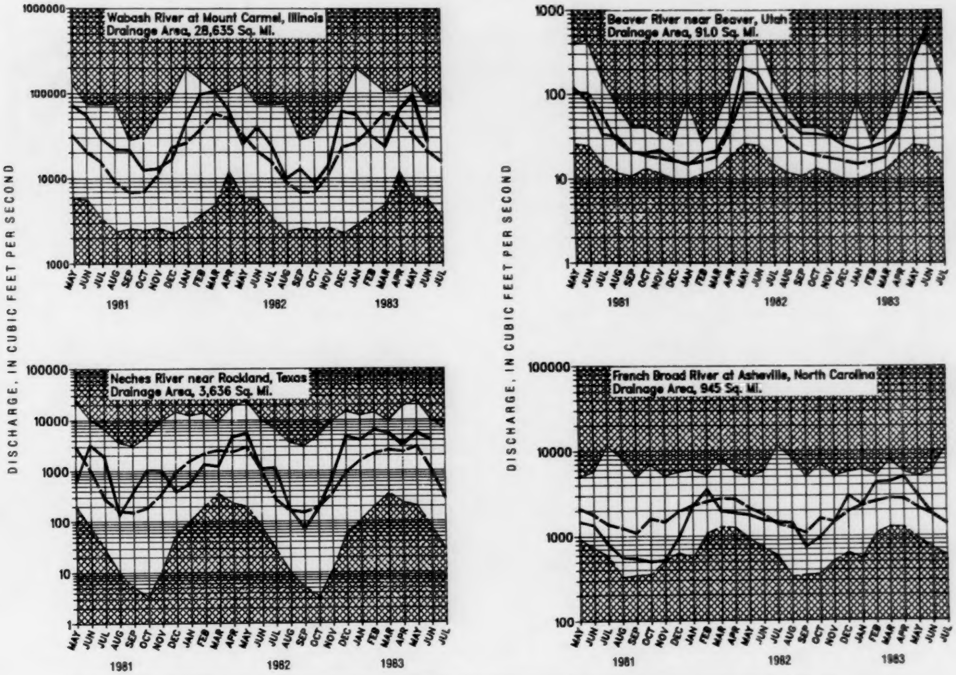


Figure 1.—Potentially favorable areas for wells yielding more than 500 gal/min from both the Red River Formation (Ordovician) and the Madison Limestone (Mississippian).

SURFACE WATER – MONTHLY MEAN DISCHARGE IN KEY STREAMS

Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951–80. Heavy line indicates mean for current period.



NATIONAL WATER CONDITIONS

JUNE 1983

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for the month based on 18 index stream-gaging stations in Canada and 164 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations that are located near the points shown by the arrows.

Streamflow for the current month is compared with flow for the same month in the 30-year reference period, 1951–80. Streamflow is considered to be *below the normal range* if it is within the range of low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range*. In the National Water Conditions, the median is obtained by ranking the 30 flows for each month of the reference period in their order of magnitude; the highest flow is number 1, the lower flow is number 30, and the average of the 15th and 16th highest flows is the median. One-half of the time you would expect the flows for the month to be below the median and one-half of the time to be above the median.

Statments about *ground-water levels* refer to conditions near the end of the month. The water level in each key observation well is compared with average level for the end of the month determined from the entire past record for that well or from a 30-year reference period, 1951–80. *Changes in ground-water levels,* unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data for June are given for six stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). Dissolved solids are minerals dissolved in water and usually consist predominantly of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. Dissolved-solids discharge represents the total daily amount of dissolved minerals carried by the stream. Dissolved-solids *concentrations* are generally higher during periods of low streamflow, but the highest dissolved-solids *discharges* occurr during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at time of low flow.

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